EXHIBIT

1

DEFENDANTS' MOTION TO EXCLUDE THE TESTIMONY OF DR. CHRISTOPHER TEAF

05-CV-0329 GKF-PJC

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)	
Plaintiff,	)	
vs.	)	4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)	
Defendants.	)	

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THE VIDEOTAPED DEPOSITION OF CHRISTOPHER TEAF, PhD, produced as a witness on behalf of the Defendants in the above styled and numbered cause, taken on the 31st day of January, 2008, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

I N D E X

Q Are you a chemist?

A Once again, part and parcel of my training and experience in toxicology, it involves inextricably chemical issues. So I don't have a degree in chemical but I am a chemist by practice. 09:17AM

Q Well, I would assume, sir, that each of those people would have some familiarity because you're scientists with many fields that are not your specific chosen specialty field. Would you agree with that? 09:18AM

A I would.

Q And I'm certain you have familiarity with some areas of science that I have not even listed today; would that be correct?

A Yes, sir. 09:18AM

Q But you're here today and you're being presented as a toxicologist testifying about toxicology and toxicological opinions; is that correct?

MR. PAGE: Object to the form. 09:18AM

A As I've said a couple of times, as I practice toxicology, as I have come to this case, it's as a toxicologist and a risk assessment specialist.

Q I have reviewed your CV, and I have reviewed a list of cases in which you've recently appeared to 09:18AM

testify. What previous cases have you been involved in that have relation to waterborne toxins or waterborne issues?

A I would say over the past fifteen or twenty years, I've probably worked on a dozen cases that involved microbiological risk assessment on microbiological issues and waterborne diseases. 09:19AM

Q Are any of those identified in materials you supplied with your affidavit?

A I don't believe they are. 09:19AM

Q Can you tell me what those twelve cases were?

A In the early '90's I worked on a case involving spray irrigation of reused water in Florida.

Q What is reused water? 09:19AM

A Water that has been treated by a variety of different processes, water treatment processes, and then is being applied to land for agricultural purposes. In this instance, for irrigation purposes. 09:19AM

Q Is it sewage water that's been partially treated and now is being applied to land; is that right?

A In this instance, that's what it was, right.

Q Okay, and who was that for? 09:20AM

A It was on behalf of a Florida City Water -- Florida Cities Water Authority I believe.
Q Which city was it?
A That's the name of the entity, Florida Cities Water.
Q Who were you representing in that case?
A I was representing Florida Cities Water.
Q What did Florida Cities Water want to do?
A They were applying reused water to --
Q Reused water?
A Reused water.
Q Which is that sewage -- partially treated sewage that you talked about?
A It is water that's been treated to FAL water regulations and is allowed to be treated and disposed.
Q But it started out as sewage water; right?
A It did.
Q And what was your position for Florida Cities Water Authority?
A That the locations and the quantities and the methods by which they were applying that were well within regulations and were without risk. It was a spray irrigation field near a -- actually within a several thousand acre orange grove.

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Q Did you do any edge of field runoff studies in that field?

A No.

Q Why not?

A I didn't do any analyses. I didn't do any testing of that field. 09:21AM

Q Did anyone do any edge of field studies?

A Not to my knowledge.

Q In your opinion --

A As I recall, it was largely an air issue, air dispersion issue. 09:21AM

Q What was the next case that you had? I'm sorry, air dispersion?

A Air.

Q How would air dispersion be part of an application of water? 09:21AM

A Spray irrigation is done by large equipment that generates large pressures and sprays water over huge distances. The concern was spray drift as they call it or movement of airborne aerosols from the property elsewhere. 09:21AM

Q What would be in those aerosols that they would be concerned about?

A They were concerned about residual chemicals that were treated -- that were part of the treatment 09:22AM

process, and they were concerned about microorganisms.

Q Was there any concern about microorganisms being dispersed by this process?

A There was concern on their part. 09:22AM

Q Was there concern on your part after you conducted your analysis?

A No.

Q Sorry?

A No. 09:22AM

Q What was the next case that you did?

A In the middle 1990's for a couple of years I worked on a project with Dade County, which is the City of Miami, that involved discussions with EPA about sewage overflows in Dade County. 09:22AM

Q What was your role in that?

A My role was to work with the modelers who were looking at the dispersion once again of the material in the Miami River and in Biscayne Bay.

Q Where does sewage overflow come from? 09:22AM

A Underground pipes for the most part is where it was coming from in Dade County.

Q It's a municipal sewage system?

A It was.

Q Anything to do with any septic sewage; did it 09:23AM

have anything to do with any septic sewage escape?
A I don't know what you mean.
Q Septic tank sewage?
A No, I don't believe it had much to do with septic tanks, no. 09:23AM
Q What was your role to help the modelers there?
A The representatives from the University of Florida, who were I think also working with representatives from -- at that time Woodward Clyde Consultants were looking at reported release 09:23AM volumes, modeling of movement of water bodies. That's not an area I work in, but I was looking at the end result of that modeling.
Q What end result were you looking at?
A Their projected concentrations or activity 09:24AM levels of bacteria in parts of Biscayne Bay and the Miami River.
Q Did you find projected concentrations?
A They did in certain areas.
Q Did you find those to be of concern? 09:24AM
A No.
Q Did you recommend that the river or that Biscayne Bay be closed or quarantined to recreational use?
A There already were those types of measures 09:24AM

already in place in certain areas. When you say did I conclude there were no problems or that there were no risks, we concluded that those risks were being managed properly, and that by virtue of the State Health Department and Dade County's cooperation, the things that needed to be done to prevent exposure were being done, and the remedial operations then took place. 09:24AM

Q Did the government health authorities determine that there was an issue that required them to take action or to at least be alert to taking action? 09:24AM

A Yes.

Q And did they in fact do so?

A Yes. 09:25AM

Q Was that the job of that kind of government agency?

MR. PAGE: Object to the form.

Q One of the jobs of that kind of a government agency? 09:25AM

MR. PAGE: Same objection.

A The Florida Department of Health and Rehabilitative Services at that time, it has a different name now, was responsible for beach closures and advisories about Biscayne Bay and the 09:25AM

Miami River. Those things were done properly as I understand it.

Q In your analysis of this case, did you determine whether there is a similar agency that exists in Oklahoma? 09:25AM

A Similar to what?

Q Similar to the agency that was involved in your studies of Biscayne Bay that imposed closure orders when they thought it appropriate?

A There are several agencies in Oklahoma that have perhaps overlapping responsibility or overlapping interest in that subject area. 09:25AM

Q So that the function exists in Oklahoma; it just doesn't exist with one agency alone; is that what you're telling me? 09:26AM

A I would say that's correct. They work together.

Q What other matter than the Dade County matter?

A I've worked on -- I worked on a long-term project with the Florida Electric Power Coordinating Group, which is an industry utility group in Florida that had involvement in reused water questions for the State of Florida, both in terms of legislation and in terms of rule making for proper regulation. 09:26AM

Q Why would the electric power group be 09:26AM

concerned about reused water?
A In this instance, they and others in the state, once again from a reused perspective, have an interest in reoptimizing the use of water, to not waste it. That was even true in the mid to late '90's. The power groups, as well as cities, have an interest in using that type of water for the kinds of things that have nominal or nonexistent exposure. In this instance, it was largely cooling towers, but during the discussions everything from cooling towers to reuse on golf courses was discussed. 09:26AM 09:27AM
Q And did you find any hazards in using reused water for any of those uses?
A There are hazards if the proper protocols and proper procedures are not applied. The regulations did deal with it that way and in our judgment were adequate and in the Department of Environmental Protection's judgment, they were adequate as well. 09:27AM
Q What is the purpose of regulations having to do with the application of, for example, reused water; what's the purpose of having that regulation? 09:27AM
MR. PAGE: Object to the form.
A Largely the reason for having those is to balance the interest in trying to reuse valuable resources with ensuring that public health issues 09:27AM

are not caused by those reuse activities. It can be municipal questions; it can be private use of wastewater. Walt Disney World, for example, uses millions of gallons a day in reuse of irrigation without risk to the public because they're able to accommodate the regulations. 09:28AM

Q What other than the Florida Electric Power Group?

A I worked on a similar project a year or two later for the City of Vero Beach that had to do with cooling towers or a cooling tower at a power plant that they operated, and that issue has also slopped over or did at least in Vero Beach to their sewage treatment plant operations. 09:28AM

Q How were their sewage treatment plant operations implicated? 09:28AM

A The facilities were nearby to one another, and there was a question about how to sample the air in the area in order to adequately demonstrate that off-site contamination or off-site movement wasn't occurring. 09:29AM

Q Was that an air issue or a water issue?

A Well, it was a water issue from the point of view that water was the medium that was being dealt with. The question of exposure was largely an air 09:29AM

issue or a water issue such that it related to deposition of these aerosols to nearby water bodies.

Q What next?

A I worked with several -- I worked on several projects involving landfilling of sludges. Many times those have both a chemical component, as well as a bacteriological component, and the questions were, what kind of criteria should you use and how would you limit exposure and how would you minimize the risk of that type of use of the sludges. 09:29AM

Q Those would be sewer sludges?

A There were a couple of different kinds, water treatment plant sludges and sludges from river dredging, which has similar kinds of issues.

Q Okay. Any of the matters that you've already talked about ever involved in litigation? 09:30AM

A Florida Cities Water project was involved in litigation.

Q How did that resolve itself?

A Permits were granted and upheld. Again, the requirements were met and the obligations were met. 09:30AM

Q Was your testimony involved in that case to assist in the obtaining of the permit?

A In a way.

Q In what way? 09:30AM

A The permit had been evaluated and granted and had been challenged in an administrative hearing, administrative trial in Florida, and so it was ultimately granted.

Q That was because the people that made the decision, the factual decision determined that there was no hazards as a consequence of this and the permit should continue in force; is that correct? 09:30AM

A Yes, I believe that's correct. I would say that's an accurate representation of what happened. 09:31AM

Q Have you dealt at all with any matters involving the application of biosolids to soil?

A No, I have not. Well, I take that back. I haven't worked on any litigation-related projects. I have worked with the Department of Environmental Protection in Florida on a couple of occasions, particularly with regard to the question of arsenic and biosolids but not microbiological issues. 09:31AM

Q Well, when I ask you that question -- I appreciate you answering it that way -- I'm asking specifically in connection with microbiological issues. 09:31AM

A I didn't understand it that way. No.

Q So you answered it just the way I needed to have it answered because it shows that my question 09:31AM

was not what it should have been. I'll try to do better. What other issues have you had dealing with microbiology?

A Microbiological issues and exposure and potential risks have been a part of a project I've been working on for probably three or four years with Memphis Light, Gas & Water. 09:32AM

Q Memphis Lake or Memphis Light?

A Light, Memphis Light, Gas & Water. It's a utility in Memphis, as you might imagine, and they have questions from time to time related to air sampling or water sampling in some of their buildings. Ice machines were also an issue at one point or a question at one point, and we did evaluation of analytical data that was collected for water, for air and for ice machines. 09:32AM

Q Why would they be concerned about -- what kind of water would they be concerned about in their buildings?

A There was -- there was a concern that there was an illness rate in a building that was above average or that was the view of the people who worked in that building. My evaluation did not conclude that that was the case. We looked at a variety of sampling datasets that were collected, 09:33AM 09:33AM

some at my request, some at the request of MLGW, to determine what the concentrations were in air of molds, bacteria, fungi, that type of thing, and bacteria in the water in the building, and bacteria in the ice machine. All those were being put forth as potential explanations by the employees who worked in the building. 09:33AM

Q So the employees that worked in the building thought there was a high illness rate and they wanted some -- wanted to find out if they had the sick building syndrome where they were working; is that kind of a shorthand way of saying that? 09:33AM

MR. PAGE: Object to the form.

A They were concerned about risks. They viewed -- had determined internally in their own discussions that there were more people ill there than was a reasonable number. 09:34AM

Q Were there more people ill there than in other parts of Memphis or other parts of Tennessee?

A No, there weren't. It's as much in that particular instance the sociological issue as it is a toxicological or microbiological issue, and it was difficult to sort through all those. 09:34AM

Q When you say a sociological issue, would that be kind of what a lay person might refer to as the 09:34AM

Chicken Little syndrome?

MR. PAGE: Object to the form.

A I don't know what that is.

Q The sky is falling according to Chicken Little? 09:34AM

MR. PAGE: Same objection.

A I wouldn't have used that phrasing, no.

Q You think there's -- would it be inaccurate to characterize it that way?

A It would. 09:34AM

Q Why?

A Because that's not what I said and that's not what I think. You may; I do not.

Q In any event, you found no problems with the illness rates? 09:34AM

A Correct.

Q What did you compare those illness rates in that building to?

A We looked at a variety of disease information from the Tennessee Department of Health. We worked 09:35AM with the medical representatives of the Memphis Light, Gas & Water organization and the external medical folks, if you will, through the nurses at the MLGW offices.

Q What of the factors you considered in 09:35AM

determining the cause of the illnesses of the people that were reporting illnesses in the building?

A It was different than that. The external medical providers didn't believe there was anything wrong. 09:35AM

Q They did not find any illness in the people?

A Correct.

Q So these would be considered primarily subjective complaints of illness?

A Yes. 09:35AM

Q And by subjective, we mean what's reported by the person who believes they're ill; is that correct?

A In this instance, everything was coming as a subjective source of information from the employees 09:36AM who complained.

Q And subjective means that's what the person who believes they're sick reports and complains about; isn't that right?

A Yes, that's correct, in this instance. 09:36AM

Q And the other kind of findings that you could have -- and you deal with subjective complaints as a toxicologist, don't you?

A We often start there. We don't often end there. 09:36AM

Q And then would it be correct to say that then you validate these things by using objective findings?

A Yes, as best you can, to the extent information is available. You may have multiple lines of evidence that lead you somewhere. It's very rarely one particular piece of information that you rise or fall on. 09:36AM

Q Were physicians actually examining these patients who complained of illness? 09:36AM

A Yes.

Q And they found no objective validation of the complaints of illness; is that what you're telling me?

A They -- either that or they found no objective evidence that what they did at their job or where they worked or where they lived was related to their particular disease. For example, their work is with which individuals had hypertension that they attributed to microbiological activity in the building. Now, you or I may laugh at that, but they did not, and they went to their physicians, and their physicians pointed out that they had these conditions for a long period prior to them working in the building, and they were able to explain why 09:36AM 09:37AM 09:37AM

it wasn't as it appeared.
Q But even though they might have an illness and even though they might work in the building, that was just a coincidence to the fact that they had in the background hypertension from some other cause; is that right? 09:37AM
A In that instance, that was the finding, yes.
Q And then you mentioned that you looked at information from the State of Tennessee. What information did you look at from the State of Tennessee? 09:37AM
A Primarily we were looking at what they had in the way of background information on buildings from a microbiology and fungal standpoint, molds, spores, that type of thing. 09:37AM
Q Did you make any comparisons of reported rates of illness between that building and -- or that area of Memphis and some other area of Memphis or some other building?
A No, not formally, no. 09:38AM
Q That wasn't the kind of information that was available from the State of Tennessee?
A It was not in that case. What we got from them was what we needed, and that was that the information that we were finding from that building 09:38AM

was consistent with other information that they had from buildings that were not at issue.

Q And did you find any molds in that building?

A Yes.

Q Did you find any bacteria in any of the water? 09:38AM

A Yes.

Q What kind of bacteria did you find in their water?

A There were a couple of different kinds at low levels, not levels that would be sufficient to cause 09:38AM the problems that were being suggested. They were well below any regulations.

Q What were they?

A The -- there were tests for coliforms, both fecal and total. 09:38AM

Q And did you find coliforms, both fecal and total?

A At low levels.

Q What is a low level?

A I recollect these were down in -- the water 09:39AM levels were probably down in the tens of colony-forming units per hundred ML's. We ultimately attributed that to -- well, by virtue of sampling in a variety of places in the building in the water supply, we were able to determine that in 09:39AM

large measure, this was a result of the non-use of certain faucets during a several day period in particular bathrooms, so that there were faucets that had low levels and there were faucets that had none, and it was largely a function of limited flow in those that were found to have coliforms. 09:39AM

Q How would coliforms get into a closed faucet?

A Well, a couple of ways. They are probably present as biofilms in water pipes that begin with the municipal water supply. They're present at low levels. Probably the farther out in the distribution system you get, the more likely they are to be present simply because you're getting out to regions in the water supply that may have a lesser degree of chlorination but, again, low levels, not -- presence does not equate to significance I guess is the way that I would say it. 09:40AM

Q What normal level is considered the non-detect level; is that less than two?

A Depends on the analysis, but that's probably a pretty good detection limit. 09:40AM

Q Is there another one you prefer to use or is that --

A It depends -- it depends in many cases on the presence of other things which may mask your ability 09:40AM

to detect coliforms or something else.
Q If you were to, for example, test the water from an outside spigot in my house in Tulsa, Oklahoma, which has not been used very much lately because obviously it's winter, would you expect to find coliforms in that sample? 09:41AM
MR. PAGE: Object to the form.
A I don't know if I would expect to or not. It's possible that you could.
Q Would it surprise you to find them in such a faucet? 09:41AM
MR. PAGE: Object to the form.
A At low levels it would not surprise me. At levels that are of significance, it would surprise me. 09:41AM
Q What is a level of significance in a faucet?
A Well, a drinking water number would essentially be zero, but a faucet, a drinking water -- hose faucet, a hose bib is not, and that would be more likely to be -- 09:41AM
MR. ELROD: I couldn't understand what you just said.
A A hose bib is not a drinking water source.
Q Is a hose bib what I'm referring to as an outside faucet? 09:41AM

A Yes, I would use the same term, and --
Q You would not consider that to be a drinking water source?
A Not on a regular basis, no.
Q When you say on drinking water, the standard is zero, does that really mean it's something below two? 09:42AM
A It's non-detect. Not present is the way it actually works. Excuse me. I need to get a drink of water. 09:42AM
Q Sure.
VIDEOGRAPHER: We're now off the Record. The time is 9:41 a.m.
(Following a short recess at 9:42 a.m., proceedings continued on the Record at 9:44 a.m.) 09:44AM
VIDEOGRAPHER: We are back on the Record. The time is 9:44 a.m.
Q Getting back to microbiology issues, tell me what other matters you've dealt with involving microbiology. 09:45AM
A I worked on a litigation project in Tampa involving indoor air issues that were related to both microbial presence but more so the presence of chemical agents in the air or lack thereof.
Q And these are allegations that the building 09:46AM

had bad air?

A Yes.

Q Did you represent the building owner or did you represent the people that thought there was bad air? 09:46AM

A In that instance I represented the building owner, actually the manufacturer of one of the products that was -- the carpeting that was used in the building.

Q What was the chemical of interest? 09:46AM

A They were concerned about toluene and several of the volatile organic substances that were detected at extremely low levels, very near the limits of detection in air.

Q In that instance did you find that the building should be closed or reconfigured? 09:46AM

A No. It was actually never an issue of close and reconfigure. It was a damages question with regard to particular individuals, that they had been harmed. 09:47AM

Q Have you, and I guess every other toxicologist always used the phrase or accepted the phrase the dose makes the poison?

A I've heard that phrase used by toxicologists and by people talking to toxicologists. 09:47AM

Q Have you used it before?

A Sure.

Q Tell us what that means, if you would.

A One of the principle tenets of toxicology is that as dose increases -- sometimes as exposure increases, dose will increase. Then in theory, rates of disease or rates of infection increase as well. It's much more complicated than that, though. 09:47AM

Q Is there a threshold of dose?

MR. PAGE: Object to the form. 09:47AM

A For what?

Q For many things, whether it be toluene that you were searching for in this building or Tylenol or drinking water?

A Sometimes there's a threshold and sometimes there's not a threshold, at least as we now understand it. 09:47AM

Q Is one of the other things that's often said in toxicology that given enough of a dose, almost everything is toxic or poisonous? 09:48AM

A I've heard people say that as well. I tend to think that's so obvious, one might not need to say it.

Q Well, for example, would one think one could overdose on water? 09:48AM

A One could.
Q And you can overdose on water, can't you?
A Sure.
Q You can actually receive a fatal overdose from drinking too much water? 09:48AM
A But that's not generally a chemical toxicologic response. That's a physical drowning response.
Q For example, with respect to these toluenes, you found them in very low levels in the building; 09:48AM is that correct?
A Yes.
Q And I gather that you concluded that because the levels were low at the point of exposure, that it was not a problem for the people in the building; 09:48AM is that right?
A In this instance, that was largely the conclusion that we drew. We also, however, were looking at the question of the source of those, and it turned out that there were certainly sources in 09:48AM the building, multiple sources that could readily explain it. The allegation that was being made was that improper installation of the carpeting, combined with water infiltration, had resulted in bacterial growth, which had then subsequently 09:49AM

produced these chemicals, these volatile organic chemicals.

Q What were the other sources of toluene that you identified as being present in the building?

A It's ubiquitous. That is, if we sampled this room, I think we would likely find low levels of toluene. It's a component of paints. It's a component of treatment for furniture, that type of thing, wood treatments. So it's pretty ubiquitous. 09:49AM

Q Dr. Teaf, that water over there on the counter has been there for about an hour or so. If you sampled that, would you expect to find any E. coli or coliform bacteria? 09:49AM

A No, I would not.

Q Is that because it's been subjected to water treatment before it came through the system? 09:49AM

A Yes.

Q Are you familiar with the method of treatment used in the city of Tulsa?

A Not particularly. 09:50AM

Q The purpose of a water treatment plant is to remove those bacteria before the water goes down the drinking water system; is that right?

A It's to kill them, yes.

Q The matter in Tampa did not actually involve 09:50AM

water except insofar as it might have triggered the toluene release; is that correct?

A Well, it did not trigger the toluene release.

Q As alleged by the other side, it triggered the toluene release? 09:50AM

A It was alleged that that was the case.

Q And you disagreed with that?

A I did. Well, I disagreed with it and then demonstrated why.

Q Okay. Let's get back to the -- if we could -- of course, I'm particularly interested in your work and concern with microbiology as it might relate to something having to do with water. Anything else having to do with water? 09:50AM

A I think, although I've worked on other projects and other training courses, the training courses probably would apply insofar as this is the kind of information that gets included in essentially every risk assessment training course or course that we ever do. I teach those courses in the departments of biology, geology, chemistry, oceanography at Florida State and some places at the University of Florida, some departments. 09:51AM

Q Those are short courses; right?

A Typically they're not. Typically they're 09:51AM

semester courses in which I may teach a particular element of it or I may teach the whole thing.

Q Well, now, when did you last teach a risk assessment course? Maybe I missed that in my earlier questions. 09:51AM

A 1999 about, 1998 or '99.

Q So those are courses that you used to teach?

A Those -- I have not taught a course at Florida State University, a full semester course, since that period of time, but I have taught in existing 09:51AM semester courses on a specific toxicology and risk assessment basis essentially several times a year.

Q Would that be like coming in as a guest lecturer in a course that someone else is responsible for? 09:52AM

A I've done that both ways. I've made people be responsible and I have been responsible.

Q Let me understand. When you come in and give one of these presentations during a course, are you the person that is responsible for the students in 09:52AM giving the grade to the student for the course?

A I've done it both ways.

Q Okay, and you've been in charge of the course?

A Yes.

Q Is that since the matters in Florida State, 09:52AM

since the late '90's?

A No.

Q Okay.

A Well, let me -- let me correct that.

Q Uh-huh. 09:52AM

A In several of the classes that I work with, I will give more than one lecture, and I will provide both the questions that are to be answered on the exam, as well as the answers to the questions that are going to be on the exam, and so while I don't 09:52AM give the grade, I'm responsible for the evaluation. So maybe that helps.

Q And the formal grading of the student, the one that goes in the transcript, is done by someone else? 09:53AM

A Yes.

Q We talked about Florida State. Have you taught full-time courses at any other university in Florida since the late '90's?

A I have taught at Florida A & M University 09:53AM probably a half a semester.

Q When was that?

A I've done that three or four times over the past ten years. More than that, probably five or six times. 09:53AM

Q What did you teach in that half semester?

A Toxicology and risk assessment, particular application to environmental risk assessment.

Q Have you previously been involved in any case involving a waterborne microbiology issue in which you found an imminent harm or risk of harm to human health? 09:53AM

A Well, in the project that we described -- that I described earlier regarding Dade County, we evaluated that based on the understanding of what was happening there at that time. It was probably not appropriate and needed to be resolved, and so we worked with the county and with the EPA to get it resolved to a point where it was adequate. 09:54AM

Q And that was the raw sewage overflow case; is that right? 09:54AM

A It wasn't -- well, it was a couple of different things. It was -- it was conveyances that were underneath the city of Miami that were either runoff or were septic, that is, from a treatment plant or they were sanitary sewers, and those from time to time are broken by construction or they're overwhelmed by a storm event, so occasionally that happens, and that was the nature of the problem in Miami at that time. 09:54AM 09:54AM

Q Is that runoff like urban runoff, for example?
A Stormwater runoff.
Q Stormwater runoff?
A Uh-huh.
Q In other words, water that's collected on the surface of a city or a town and then gets into -- whether it's a stormwater system or however, it runs out of town as a stormwater; is that right? 09:55AM
A It can, sure.
Q And that -- is that a source of bacteria? 09:55AM
A Can be. Depends a little bit on the city and how big it is and how many people live there, how significant that might be.
Q Why is it a source of bacteria?
A Couple of reasons. There are bacteria in the air at low levels that may deposit on surfaces. There are animals that live in the city that may be the result -- that may cause -- people walk around in the city. So there are a couple of different sources of bacteria, and some bacteria, not fecal coliforms, some are basically naturally occurring; they're free-living. Coliforms are not for the most part. 09:55AM
Q The fecal coliforms, are you saying that urban runoff contains fecal coliforms? 09:56AM

A It can.
Q Would runoff ever not contain fecal coliforms?
A Sure.
Q If you were at the outside of a city where the water was coming, would you ever expect to not find fecal coliforms in the runoff? 09:56AM
A Sure, I would expect to find what I found, and I've seen situations where you find essentially none, by your definition, below the detection limit, and I've seen situations where they're higher, and it depends on the size of the city, depends on the topography of the city, depends on the rainfall event that you're speaking of, depends on previous rainfall events that may have occurred. 09:56AM
Q Why does it depend upon the rainfall event? 09:56AM
A Because in order for there to be stormwater runoff, there typically needs to be a rain.
Q Has to be a storm; right?
A Yes.
Q And why do you mention how recent was the previous storm; why is that important? 09:56AM
A Well, it may mean that you've already seen runoff that carried off some of the material. So the subsequent day or days, there may be much less or maybe not. 09:57AM

Q First storm rinsed it cleaner so that the second storm didn't have as much to rinse into the waterway?
A I prefer my way, but that's okay.
Q Okay. You mentioned the size of the city. What size of city would you expect to have that kind of urban runoff? 09:57AM
A I don't mean necessarily in terms of geographic size. I mean in terms of activity patterns, vehicular traffic, pest control, those types of things, good, bad or indifferent. 09:57AM
Q Have you been through the Illinois River watershed here in Oklahoma?
A Yes.
Q What cities or towns have you seen? 09:57AM
A Tahlequah, been through Siloam Springs, not only for this but for a number of other things, went through a number of small towns along the main stem of the Illinois River, little towns, Chewy and some other locations like that. 09:58AM
Q Did you go through Fayetteville at all?
A No, but I've been to Fayetteville many times.
Q Well, you probably have.
A Yes, I have.
Q Is Fayetteville the kind of city that would 09:58AM

have urban runoff?

A By definition, because Fayetteville is a city, it will have urban runoff.

Q Well, are the towns and cities that you saw in the Illinois River watershed, although they vary in size, are those potential sources of E. coli or coliform bacteria or other forms of bacteria in the Illinois River watershed? 09:58AM

MR. PAGE: Object to the form.

A They are only sources insofar as if you catalog every possible thing, they could be considered, but in order to understand how significant that is, you have to look at what the other sources are. In Dade County, for example, the stormwater runoff locations that we identified were much less of significance than the sewage treatment plant piping that was broken during construction, for example. So while the numbers were not zero, they were not particularly significant from the standpoint of human health, that is, the runoff values. 09:58AM 09:59AM 09:59AM

Q Particularly when compared to raw sewage; is that correct?

A Particularly.

Q Which is what was the case in Dade County; 09:59AM

isn't that right?

A Well, some cases it was raw sewage; some cases it was treated sewage.

Q Partially first stage treatment?

A I think every possible opportunity existed there, from no treatment to complete treatment. 09:59AM

Q You're telling me that that system needed some work down there?

A EPA felt that it did.

Q I gather you didn't disagree? 09:59AM

A We ultimately helped them solve their problem, yes. We got the situation back to where it needed to be.

Q Did you make any effort to determine the nature and extent of urban runoff in the Illinois River watershed? 10:00AM

A No, not specifically. We looked at a variety of other sources.

Q I've marked as Exhibit 1, sir, your CV. Did you prepare this, sir? 10:00AM

A Yes.

Q This is dated October of 2007 and we're not in February of 2000 or January of -- where are we? Is this January or February?

MR. BULLOCK: We're still January. 10:00AM

MR. PAGE: It's the 31st of January today, John.

MR. TUCKER: Thank you, David.

MR. PAGE: You're welcome.

MR. TUCKER: At least I know I'm in Tulsa, Oklahoma. 10:01AM

MR. PAGE: Yes, sir.

MR. TUCKER: And I know that it's about to snow.

Q Is this CV current, sir? 10:01AM

A Yes. I haven't made any changes to it since this time.

Q Are there any changes that needed to be made that you just haven't made yet?

A I think I have one or two papers that have been submitted for publication or for presentation, and I notice one says it's scheduled for November '07, and that was done. So there are a couple of trivialities but nothing significant. 10:01AM

Q Are the two papers that are pending papers that have as their subject anything having to do with waterborne bacteria, coliforms, E. coliforms, anything like that? 10:01AM

A No.

Q Would you identify for me those things on your 10:01AM

CV that specifically relate to your waterborne experience or your experience with E. coli or coliform bacteria?

MR. TUCKER: May I suggest while he's looking -- we have a notice that we're about out of tape -- that I let him continue to look while he replaces the tape. 10:06AM

MR. PAGE: No. I think we stay on the tape when you want him to do these things.

MR. TUCKER: Okay. 10:06AM

VIDEOGRAPHER: We are now off the record. The time is 10:09 a.m.

(Whereupon, a discussion was held off the Record.)

VIDEOGRAPHER: We are back on the Record. 10:11AM The time is 10:10 a.m.

Q I see by looking over your shoulder, sir, that you are back into the 1990's now; is that correct?

A Yes.

Q That's far enough back. I'd like you to look over that list of the ones you marked and tell me which of those -- in which of those papers that you have marked did you review the presence of waterborne illness. 10:11AM

MR. PAGE: Object to the form. That wasn't 10:11AM

what you asked earlier.

A I thought you asked to identify the entries on my CV that relate to risks from microbiological waterborne disease.

Q I am, I did. Now, I want to narrow down the list that you marked. 10:11AM

A Okay.

Q And I want you to identify which of those papers that you have marked -- in which of those papers that you have marked did you find the presence of waterborne illness? 10:12AM

A Let me start by saying I didn't only mark papers. I marked other aspects of my experience that relate to that.

Q I understand, but I'm asking you a question about papers now. 10:12AM

A Okay. The 2006.

Q Would you give me a page number, please?

A Page 8.

MR. ELROD: 8? 10:12AM

A 8. The fifth entry down, Disinfection Byproducts: Benefits and Limitations of Existing Drinking Water Guidelines, that was a presentation I gave in December of '06 related to chlorination and other types of purification processes for drinking 10:12AM

water, what they were designed to do and what the potential limitations were to those processes.

Q As a part of that paper, did you talk at all about people that were actually becoming ill from waterborne exposures? 10:13AM

A I'm sure that was -- the introduction was why we bother to do this because bacteria at the proper or at the -- at a high enough level are of concern, and so municipal and public drinking water entities treat the water to prevent that. 10:13AM

Q And there are byproducts of disinfection; is that correct?

A Yes.

Q And if those get beyond certain levels, that can be hazardous, can't it? 10:13AM

A Yes.

Q And so this paper dealt with that tradeoff between treating the water and byproducts of disinfection?

A No. It actually dealt with there not really being much of a tradeoff there. We have to do the bacteria or you'll die or you'll get very, very sick, and what are the ways in which we might, A, minimize the production of these disinfection byproducts or if not minimize their production, then 10:13AM

remove them.

Q What's the next one then?

A The Overview of the NATO CCM Pilot -- CCMS Pilot Study, it's the next one, Sustainable Development in Central Asia. My role in that, and there's several entries in here that relate to that, was regarding chemical and biological problems in central Asia that are related to industrial or agricultural or industrial -- excuse me, municipal development and how those might be managed. 10:14AM

Q What were the biological problems that you found in that paper?

A They were largely questions of microbiology, bacteria in water supplies and how one manages those. 10:14AM

Q In other words, how you treat the water supply for a municipality?

A Right. Why do you treat it and if you are going to treat it, what would you do.

Q Okay, and what else then fit that definition where you found waterborne illness? 10:14AM

A Waterborne illness was a subject that was discussed in the paper. The remaining two on this page are the two chapters in a book that we wrote for the World Health Organization. It's the second 10:15AM

or third from the bottom, Industrial Mining and Military Sites, potential hazards, information needs and then control and protection. This had elements both of chemical issues because industrial military sites typically operate like small cities. They have issues of water treatment, water production, water distribution.

Q That deals with drinking water?

A And exposure.

Q That deals with drinking water? 10:15AM

A Correct, and discharge of industrial or municipal or military wastes from those facilities to water bodies and how that needs to be managed and how you need to protect against improper discharge.

Q Sewage runoff and storm runoff? 10:15AM

MR. PAGE: Object.

Q Is that right?

MR. PAGE: Object.

A Those are two of the possibilities, right. The -- subsequent on Page 9, there's a similar pair of entries, Teaf and Kuperberg. That's a publication, which is in cooperation with the World Health Organization, parallel to the groundwater monograph I just mentioned. This is a mock surface water monograph. 10:16AM

Q Is that the fourth one down?

A Fifth and sixth. Well, yeah, fourth and fifth.

Q Where does science stand on the mold issue and risk assessment as a tool for water resources decision making in central Asia? 10:16AM

A No. I'm on Page 9.

Q I'm sorry.

A Teaf and Kuperberg.

Q I see. 10:16AM

A This is a similar companion piece to the one we produced on groundwater contamination.

Q Again, are you looking towards the end result being water treatment for public consumption?

A In part. Also in part a recognition that water use is integrative, that is, everything that happens upstream affects something that happens downstream. Particularly in central Asia and eastern Europe, those are problems because those rivers are very long and run through long areas of the country, and the first people that get the water often cause it to be compromised in terms of its utilities to those below. 10:16AM 10:17AM

I marked the last one at the bottom of the page but that may not fit your definition. That's 10:17AM

-- in our discussions of Chemicals in the Workplace, I always have a discussion about microbiological issues as well.

Q We're talking about waterborne illness.

A I'm trying to work with you here. 10:17AM

Q Good. Thank you.

A Page 10 is Teaf, Ritchie and Coleman. That's the Status of Science on Mold and Health Issues. That's a bacteriological -- that was a bacteriological question that had to do with fungi, 10:18AM mold and bacteria.

Q Were the fungi, mold and bacteria caused by water?

A Could be caused by water, could be caused by moisture in a water with subsequent regrowth. 10:18AM

Q I understand.

A Later in that issue or Page 10 also Teaf and Kuperberg, and Teaf and Yessekin and Khankhasayev, these are -- let's see.

Q More of your central Asia work you talked about? 10:18AM

A Correct, correct.

Q All right.

A Again, surface water, groundwater, runoff, agricultural. Let's see. Teaf 2003, it's toward 10:18AM

the bottom of Page 10, Overview of Risks Posed By Biological and Chemical Contaminants in Drinking Water. Again, part of the work that we did in central Asia. I apologize if I'm talking too quietly. The next page has to do with bacteria but only indirectly does it have anything to do with surface water. It's Petrisor, Stefanescu. It's about eight down on Page 11. 10:19AM

Q It's about how you revegetate mine tailings?

A Right. It's bacteria being used to treat and tie up the metals so that mine tailings can be revegetated, can be reclaimed. That's -- actually I think the sites were in Romania. 10:19AM

At the bottom of that page there's two or three that fit together. They have to do with bioremediation, bacterial remediation that we did on a series of sites in Poland and how we evaluated the hydrocarbons there, what kind of bacteria were used, how we dealt with the bioremediation, how we dealt with the runoff and potential environmental impacts of this bacteria. 10:19AM 10:20AM

Q And in those -- in that instance, did you find any illness caused by the water runoff?

A It was a large petroleum refinery and, no, we did not. 10:20AM

Q And, remember, I'm trying to ask you about which of these have to do with waterborne illness, illness from waterborne causes.

A Next one that I have is on Page 14. Teaf '98 and Kuperberg and Kolta and Kuharski. Those, by your more recent definition, don't have anything to do with drinking water specifically, but they are drinking water and its protection are elements of certainly the second one and to a lesser degree the first one. 10:20AM

Page 15 and the first one may not fit your definition. It has to do with risk-based corrective action, and that has an element of waterborne illness protection in it as well. Towards the bottom Wilson, Stabile, we submitted this paper, Behavioral Modification. This is an issue that has to do with shellfish in Florida and elsewhere that have microbiological contamination and where the water supplies need to be protected in order to prevent that from happening. 10:21AM

Q You said you had other reasons to be in Siloam Springs other than this case. What reasons did you have to be in Siloam Springs than this case?

A Because I lived in Little Rock for probably three or four years, and I got to Siloam Springs to 10:21AM

visit.

Q Just to see the area and tour?

A My wife and I tried to travel around Arkansas while we lived there, and it was very pleasant up in the north and northwest. 10:21AM

Q Have you been there -- you say you've been there in this case?

A Yes.

Q When were you there in this case?

A Last -- well, I'd say last summer. 10:22AM

Q When were you there as a student?

A In 1982 to 1985.

Q Did you see any difference in the area between '82 and '85 and when you were there last summer?

A I don't recall looking at it from that point of view. 10:22AM

Q Well --

A I don't recall that, no.

Q Do you recall any difference in the development of the area? 10:22AM

A Well, not specifically, no.

Q Did you notice whether it was more developed than it was in 1982?

A I don't have a recollection that I specifically made that comparison, no. Page 16, 10:22AM

there is an EPA and DEP waste inspector training institute that I taught at, and that had to do with chemical and microbiological issues of exposure, and then ninth one down is Teaf, Stabile and Winter. That again was biological and chemical effects on seafood, actually shellfish and how water quality may have an effect on that, and then I think I stopped after that point. 10:23AM

Q People do get ill from eating shellfish, don't they? 10:23AM

A Yes, they do.

Q And when people get ill from eating shellfish, do the regulatory authorities determine where the shellfish came from?

MR. PAGE: Object to the form. 10:23AM

Q Is that their goal?

MR. PAGE: Object to the form.

A Sometimes it is to the extent that they can do that.

Q And why do they want to do that? 10:23AM

A So that they can provide -- well, one of the reasons is so they can evaluate whether the procedures they have in place are adequate, and another reason is so they can potentially warn individuals who may be in that area, and it can be a 10:24AM

bacteriologically, and that there are historical reports of high levels in that material.

Q Multiple reports of high levels of what?

A Bacterial activity of a variety of types.

Q These are -- this is literature discussing now; right? 10:49AM

A Right.

Q All right.

A That large quantities of that material are disposed on land in concentrated areas over focused periods of time during the year, that there are significant -- well, there are very high levels of bacterial contaminants in immediately adjacent samples collected from fields after runoff events, that those same kinds of bacteria, microbiological organisms, are found in the water bodies as well, that there is a chemical linkage between the bacterial and the chemical signature or fingerprint of the material that Dr. Olsen will speak about, and that there is more recently a rather specific genetic marker, biochemical marker that's been identified as being able to identify the source of bacteria to a large degree. 10:49AM 10:49AM 10:49AM

Q That's Dr. Harwood's area?

A Yes, sir. 10:50AM

Q Any other multiple lines of evidence?

A If I think of anything else, I'll let you know. I think that pretty much covers it. Well, the obvious one that you started the question with I guess would be the information that's available regarding particular kinds of disease rates in northeastern Oklahoma that are of the same -- caused by the same organism that has been reported significantly in waste material from poultry. 10:50AM

Q How many current matters that are or might go into litigation are you working on right now? 10:50AM

A Or might go into?

Q The suit has either been filed or you're working on a matter that might go into suit.

A Well, I'm much more comfortable with the first part of that than the second. I don't have any way to know the second. 10:51AM

Q How many are in suit now that you are working on?

A I'm probably working on half a dozen actively. 10:51AM

Q Where are those cases?

A One is in Tulsa, Oklahoma, Oklahoma City, Oklahoma. That's this case. I'm working on a groundwater contamination case in South Carolina involving methyl tert-butyl ether in ground drinking 10:51AM

Q But Delaware County is below the state average, isn't it?

A Delaware County is a very, very small piece of the puzzle in the Illinois River watershed.

Q Yes, sir, but more chickens are raised in Delaware County than Adair County; isn't that true? 11:41AM

A The issue in my view is not necessarily, although it may be correlated with number of chickens, it's more correlated with what happens to the material that comes from the chickens and where is that placed and how much exposure potential is there. If I took a pound of chicken litter and put it inside of a glass vase and sealed it up and put it on the table, it wouldn't have any health significance. If I broke that glass vase or I spread it somewhere and somebody came in contact with it, then there is a potential issue of contact. 11:41AM 11:42AM

Q Well, what I'm trying to get you to agree with, Doctor, I think you were almost there but you dodged me, is that the raw diseases, disease rates in Oklahoma or Arkansas in the IRW for either Campy or Salmonellosis tell you nothing in terms of the source of those diseases; isn't that true? 11:42AM

MR. PAGE: Object to the form.

A In themselves, if you had no other information 11:42AM

available to you, they would only be measures of incidents. However, we have other information available to us, and I mentioned what that was earlier today.

Q Have you spoken with Dr. Mike Crutcher since he gave his deposition? 11:42AM

A No, sir.

Q Have you seen Dr. Crutcher's deposition?

A Yes, I've seen parts of it. I've seen the whole thing. I've only read parts of it. 11:43AM

Q Is there anything in Dr. Crutcher's testimony with which you disagree?

A I don't know that I read it with that in mind, so I would say off the bat, probably not. There are areas where if he had a longer discussion, we might, 11:43AM but I would just -- I think some of his understanding of things is that of a director as opposed to a field person.

Q As opposed to a what?

A A field person, an epidemiologist, for example. 11:43AM

Q Well, do you consider him to be co-opted by politics?

MR. PAGE: Object to the form.

A I have no idea what his politics are, sir. 11:43AM

Q Too late.

A Well, I guess I really need to stop you for a second and say I don't -- your characterization of theoretical sick people is not a reasonable thing to say. What is a reasonable thing to say is there are people out here, who even if you went and spoke with them and they said I've never been sick or I have been sick, the ability to discern what caused that sickness or what their recollection may be is really not relevant. What's relevant is that there are numbers in the watershed out here widely dispersed that are actually quite remarkable and very high, and I believe that with the combination of that and the high use of the Illinois River, you've got a situation where you are asking for trouble, and not you personally, but a person is asking for trouble, and I think those kinds of numbers have in the past been problematic, and we know of other instances in which we had sick people. We went to the watershed. We didn't find the bacteria there, but it was there. It was there in a state that wasn't detectable. So I don't know if that clarifies or muddies the situation but I think -- 11:59AM 12:00PM 12:00PM 12:00PM

Q I understand what your position is and the position of the State, but let me ask it to you this 12:01PM

words that get you.

A Yes, sir.

Q Isn't and or -- well, I meant or and I'm glad we got that clarified. An indicator organism by itself is not necessarily pathogenic, is it? 01:19PM

A Not necessarily, but it can be.

Q And if you have high indicator or high amounts of indicator organisms, do you believe that's a red flag to check for pathogens?

A It's a red flag that pathogens may exist there, and it's, I think, very well recognized as that. 01:20PM

Q Were tests done in this case in the watershed looking for identifying Campylobacter, Salmonella, either one? 01:20PM

A Both at times, yes.

Q And was it found?

A I don't recall that -- well, there were some very high numbers found early on, but I believe that those data were ultimately -- we elected to not use those data because the analytical profile wasn't proper for them. So I think that it was originally sampled for, but I don't recall that they were found. 01:20PM

Q Where was the initial sampling that resulted 01:20PM

in the high returns taken?

A I don't recall which samples they were, but I know there were some.

Q How many?

A I couldn't tell you that. 01:20PM

Q In what way did it not fit the profile?

A That the analytical techniques that were utilized were not -- were non-standard I think was the phrase that was used. So we elected in an abundance of caution not to use that information. 01:21PM

Q What entity used the analytical techniques?

A I don't recall which laboratory. There was -- FoodProtech was one, but I don't recall each of them.

Q Any others? 01:21PM

A I don't recall if there were others or not.

Q And so once those -- once that data was discarded because of the protocol difficulties, you say there was no other data that supported that finding? 01:21PM

A There were no other reported detections of those, but as we know, that doesn't necessarily mean that they're not present.

Q In your affidavit, would you please turn to Paragraph 9. That begins there, demonstrated 01:21PM

supplied in this case; is that correct?
A Yes.
Q Now, I've only presented 2005, although you presented other materials in your report, but we're limited by time, and I believe this is illustrative. 02:04PM
You relied on this Exhibit 9 in forming your opinions in this case; is that correct?
A Yes.
Q If you look at Adair County, we see that there were ten reported cases of Campylobacter in 2005; is 02:04PM
that right?
A Yes.
Q And that's what you and Mr. Elrod talked about today, and as I understand it, I know you probably heard this question enough times that it's getting 02:04PM
redundant to you, so I beg your indulgence that I ask it to you again, but as far as these ten cases of Campylobacter in 2005, there is no information that clinically indicates the -- either the cause of this Campylobacteriosis or that it had anything to 02:05PM
do with any contact with water in the Illinois River watershed?
MR. PAGE: Object to the form.
Q Is that correct?
A I don't know that it does or it doesn't. 02:05PM

That's not the kind of information that I would be able to acquire, nor would they tell me whether it exists. It's a confidentiality issue.

Q It's not information that you have?

A If I can't get it, I don't have it. 02:05PM

Q Did you ask for it?

A Sure.

Q I misunderstood. I thought perhaps your associate was the only one that talked to the people in Adair County. 02:05PM

A We asked for it.

Q And you asked them to give you the cause of the Campylobacteriosis?

A Sure, but they answered in the proper way, which was we don't disaggregate these files, period. 02:05PM

Q While you have that 2005 data in front of you, let's look at some other counties, if you will. What's the county right below Adair, a little bit below? Look down to Harper County, for example.

MR. PAGE: Object to the form. 02:06PM

Q Do you see Harper County?

A Yes.

Q What is its rate of Campylobacteriosis?

A 56.15.

Q Is that higher than Adair County? 02:06PM

MR. PAGE: Object to the form.

Q And one from Sequoyah County?

MR. PAGE: Object to the form.

A On this table it shows one entry there, and I just would caution you not to read too much into that. 03:04PM

Q Why not?

A Because -- well, a couple of reasons. One, 0157 is very unusual, and as soon as you begin to have instances where you've only got one or two cases in a county, your ability to understand what is causing it is much smaller, and I guess, secondarily, I would say that I'm not suggesting that E. coli 0157:H7 can't cause illness. What I'm saying is that there are multiple lines of evidence here, and picking one and identifying it and discussing it is fine, but I don't want you to lose sight of the others. 03:04PM

Q Did your group make any effort to test for Giardiasis? 03:05PM

A I don't believe we did.

Q Or Cryptosporidium?

A No.

Q Cryptosporidium is another one of those common causes of diarrhea, isn't it? 03:05PM

A It can be. It's actually much more serious than that in a lot of instances.
Q You talked about in your affidavit Giardia and Cryptosporidium. As I understand, you have no evidence that supports the presence or absence of either of those; is that correct? 03:05PM
A Other than the fact that they're both found in poultry manure and litter in the literature.
Q In the literature?
A We have not -- 03:05PM
Q You did not test for it one way or the other?
A We did not. To my knowledge we did not.
Q So as to something that was in your affidavit, to provide additional information as opposed to something you believe you have evidence of existing in watershed? 03:05PM
MR. PAGE: Object to the form.
Q Is that right?
A That's not right.
Q You do have evidence of it existing in the watershed? 03:06PM
A We have evidence that it exists in the watershed insofar as indicator organisms serve the purpose that they serve. That is very well understood. Those are the best measures that we 03:06PM

have for the potential likelihood of other things, but we did not look for it, no, sir.

Q Do you know of any better evidence of actual illness in a county than the county health data that you've discussed here today? 03:06PM

A No. I think it serves the purpose that it was designed to serve. It's just that it's limited in its ability to draw the kinds of conclusions that we're trying to draw.

Q And do you know of any better evidence than that evidence? 03:07PM

A I do not, other than just your ability to gather together multiple lines of evidence of which that is one.

Q Referring you back to your affidavit, if you would look at No. 12 in your affidavit, please. 03:07PM

A Yes, sir.

Q You say in there that recently over six consecutive years, there has been widespread measurements of the presence of indicator organisms in surface waters of the Illinois River watershed, which indicate that those waters exceed the Oklahoma water quality standards and/or health-based screening levels. Okay? 03:07PM

A Yes. 03:07PM

A My recollection was that Campylobacter was not detected in the water samples, and I think we talked a little bit about why that might be.

Q Do you know what the infecting dose would be of Salmonella? 03:24PM

A I think it's more than that. It's more than Campylobacter.

Q Approximately how many?

A I would say more like a thousand.

Q And if it took a thousand Salmonella to infect you, what kind of reading would you expect from the water that you tested to find that Salmonella? 03:24PM

MR. PAGE: Object to the form.

A I don't understand that question.

Q Well, what would you expect to find if you did a water sample looking for Salmonella and you found Salmonella; how high would the concentration have to be in the water in order for you to get to reasonably be able to swallow that much water without choking? 03:24PM 03:25PM

MR. PAGE: Object to the form.

A It's on the order of ounces, as it would be with Campylobacter.

Q And that's assuming what concentration in the water? 03:25PM

circumstances. We've found it months after it's released in some circumstances.

Q Where?

A Sediment -- where has it been found?

Q Yeah. What geographic location? 03:27PM

A It's literature it's been well reported and we've found evidence.

Q So when you say we found, it's we as in the scientific community, not we as in Dr. Teaf or his assistant? 03:28PM

A That's correct.

Q Are you aware of an instance in which E. coli 157 -- 0157:H7 was actually found in poultry litter in this watershed?

A I don't think we looked for that particular strain. I don't know that it didn't exist. I only know that we didn't look for it. 03:28PM

Q Have you done any work to rule out other potential sources of bacteria as the cause of reported diseases in the watershed? 03:28PM

A Excuse me?

Q Have you done any work to rule out other potential sources of bacteria as the cause of the reported diseases in the watershed?

A In terms of identifying relative importance of 03:28PM

A They are, and the importance of those goes not only to the loading but also to the way in which that material was introduced in the environment, the circumstances.

Q How do cows introduce their material into the environment? 03:32PM

A Defecate on the ground.

Q Or in the streams?

A Perhaps.

Q Or in the ravines? 03:32PM

A Or in the forests.

Q Or in the streams?

A I think you said that.

Q Or in the springs?

A You know, all those things are possible, but I think, based on the information that's available to me from -- particularly from Dr. Olsen through the chicken and bacterial fingerprinting or signatures, it's clear that the bacteria are far more likely to be related to the chickens than the cow. 03:32PM 03:33PM

Q Do you know if, talking about this DNA sampling that took place, this diagnosis of the presence in the watershed from poultry, do you recall that, Dr. Harwood's work?

A I don't know that I calculated it quite that 03:33PM

A Yes. I normally assume that unless I have reason to think otherwise.

Q I understand. You talked a little bit about Dr. Olsen. Tell me what connection you have with Dr. Olsen in the past. How have you been connected with him; have you worked with him before? 03:56PM

A No, I've not. I didn't Roger Olsen before this project began.

Q And you've been with him several times and met with him several times during this project; is that right? 03:56PM

A Yes.

Q What do you understand his expertise to be?

A I think he brings several things to this. His training is chemistry I believe, and he's also got familiarity with statistics and experience in field projects like this of large scope in terms of managing the collection of information, the implementation of sampling protocols and that type of thing. 03:56PM

Q Did you discuss his -- I think you described his poultry signature. Is that what you called it or did I miss --

A It's been called both signature, fingerprint.

Q What do you call it? 03:57PM

A I call it both.
Q What is your understanding of what that signature is that he's going to testify about?
A Well, I'll let him go into the details, but I understand that it's a principal component analysis, which I am generally familiar with. 03:57PM
Q It's P-A-L or P-L-E?
A Principal, P-A-L.
Q All right. What is a principal component analysis? 03:57PM
A It's a statistical evaluation of data to identify multi-variant comparisons, that is, if you have a lot of data, a lot of samples with a lot of information per sample, it's very difficult to look at it all at one time. This is a statistical technique that allows you to do that by making internal comparisons among various variables and their characteristics. 03:57PM
Q Do you know what he looked at other than poultry as to determining whether something had a particular -- is it a chemical signature you're referring to? 03:58PM
A Yes.
Q Had a particular chemical signature?
A Well, again, I'll let him go through the 03:58PM

details, but I think some of the details we talked about today were the Enterococci, some of the bacterial measures, nitrogen, phosphorus, some of the metals. So I mean of those, I believe that 20 were selected as being the optimal group to use according to the standard PCA protocol. 03:58PM

Q And that's the principal component analysis?

A Yes.

Q Would you list for me the previous matters that you have been involved with in which a principal component analysis was done or performed? 03:58PM

A I've not worked on a project where it was done, but I know what it is.

Q This is new to you as far as being involved with a project? 03:59PM

A It's not new to me as a technique, but it's new to me in terms of it having been used on a project in which I was involved.

Q And what is your understanding of what he found using this principal component analysis? 03:59PM

A That for the bacteria, somewhere between 70 and 85 percent of the samples that were exceedances, that is, exceedances of surface water criteria showed the poultry signature, showed the poultry fingerprint as it's been defined by his PCA 03:59PM

A Not in every instance, but perhaps in many, and perhaps you'll find things that are different and worse than Campylobacter. I don't want you to read more into it or less into it than is important.

Q Yeah, and what I'm asking is just it's not every instance that you see both Campylobacter correlating with fecal coliform; that's my point, and I think you agree with that? 05:14PM

A I don't know that you could make that kind of correlation. What you can say is at, for example, 61 coliform units per hundred ML's of Enterococci, there are roughly 8 in 1,000 disease rate of gastrointestinal disease. What is causing that gastrointestinal disease could be E. coli, could be Campylobacter, could be Giardia, could be a variety of things. 05:14PM

Q But nobody knows; correct?

A Well, nobody needs to know because they have answered the question in a way that doesn't require that you know each component of the puzzle. As we learn more and as the analytical techniques get better, we can certainly go that direction, but to my knowledge, it hasn't gone that way yet. 05:14PM

Q So what evidence have you seen that there is actually Campylobacter, for example, in the waters, 05:15PM

surface waters of the Illinois River watershed?
A You know, I would have to say what I said earlier this morning and, that is, of the bacteria that are commonly associated with poultry, Campylobacter is the most consistently and regularly associated. Given that and given what we know about the biology and environmental survival of Campylobacter, I feel confident it's there. Campylobacter has an odd characteristic of its life state that's also shared by E. coli and some of Vibrio where it can go into a dormant state. It means that you would do a test for it, try to culture it. You would conclude that it's not there, when in fact it is there, and that's for Campylobacter probably more well demonstrated than for any other bacteria. 05:15PM 05:15PM 05:15PM
Q Okay, but it's an assumption that it's there and may be based upon certain factors that were in the scientific literature, but it's an assumption it's there based on the -- 05:16PM
MR. PAGE: Objection.
Q -- indicator organisms; correct?
MR. PAGE: Objection.
A Yeah. I think I've described it as best I can. That's true. 05:16PM

Q It's an assumption?
A It's an assumption based on specific facts that we know.
Q Okay. That same assumption applies to Salmonella and E. coli 157; correct? 05:16PM
MR. PAGE: Object to the form.
A We did not specifically sample for E. coli 157, and for Salmonella I think the same thing would apply.
Q Same assumption? 05:16PM
A Based upon supporting information.
Q Okay.
A It's not an assumption in the same way that some assumptions are made.
Q I'm going to ask you if you agree or disagree with this statement and, that is, that the -- a complete moratorium on the land application of poultry litter in the Illinois River watershed will not necessarily fix any bacterial issues in the waters of the Illinois River watershed? 05:16PM 05:17PM
A You're asking me to agree or disagree?
Q Uh-huh.
A I would disagree in the sense that it would have a dramatic impact on it to the point where I would expect that it would take the levels that we 05:17PM

SIGNATURE PAGE

I, Christopher Teaf, PhD, do hereby certify that the foregoing deposition was presented to me by Lisa A. Steinmeyer as a true and correct transcript of the proceedings in the above styled and numbered cause, and I now sign the same as true and correct.

WITNESS my hand this _____ day of _____, 2008.

_____

CHRISTOPHER TEAF, PhD

SUBSCRIBED AND SWORN TO before me this _____ day of _____, 2008.

_____

Notary Public

My Commission Expires:

_____

05:52PM

C E R T I F I C A T E

STATE OF OKLAHOMA)
) ss.
COUNTY OF TULSA)

I, Lisa A. Steinmeyer, Certified Shorthand Reporter within and for Tulsa County, State of Oklahoma, do hereby certify that the above named witness was by me first duly sworn to testify the truth, the whole truth and nothing but the truth in the case aforesaid, and that I reported in stenograph his deposition; that my stenograph notes were thereafter transcribed and reduced to typewritten form under my supervision, as the same appears herein.

I further certify that the foregoing 309 pages contain a full, true and correct transcript of the deposition taken at such time and place.

I further certify that I am not attorney for or relative to either of said parties, or otherwise interested in the event of said action.

WITNESS MY HAND AND SEAL this 1st day of February, 2007.

_____

LISA A. STEINMEYER, CRR
CSR No. 386